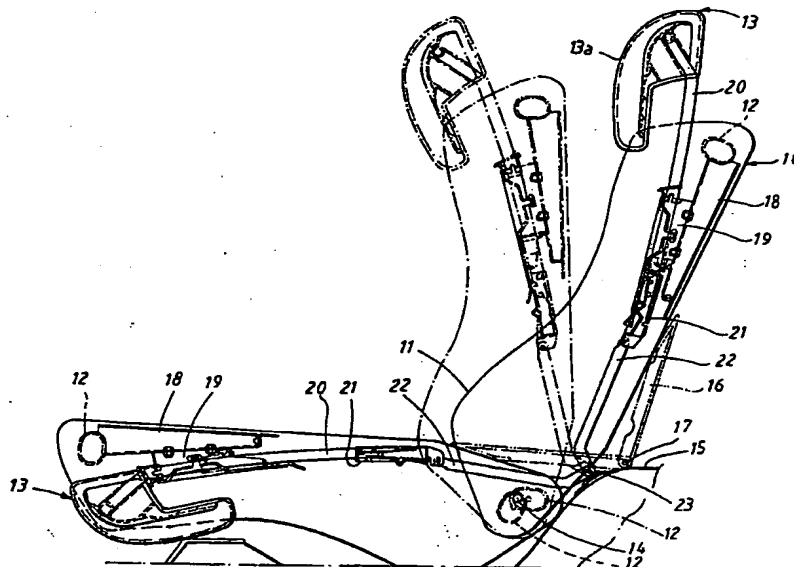




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: NECK PROTECTION FOR FOLDABLE BACK SUPPORT OF A VEHICLE



## (57) Abstract

A head restraint for a backrest (10), in a vehicle, which backrest is foldable in the vehicle's (15) longitudinal direction, for example for forming a luggage space. The backrest is provided with an inner frame (12) which is pivotally supported at a first pivot location (14). The head restraint (13) is displaceably supported in the framework (12) and connected with a second pivot location (23) in the vehicle which is positioned at a certain distance from the first pivot location in the vehicle's longitudinal direction. The invention achieves an automatic retraction of the head restraint (13) towards the backrest upon folding of this forwardly, or respectively backwardly, and displacing this back out into an active position when the backrest is folded back.

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## NECK PROTECTION FOR FOLDABLE BACK SUPPORT OF A VEHICLE:

## 5 TECHNICAL FIELD

The present invention relates to a head restraint for a backrest in a vehicle which backrest is foldable in the vehicle's longitudinal direction and which is provided with an inner framework which is pivotally supported at a first  
10 pivot location.

## BACKGROUND ART

Vehicle seats with backrests according to the above are often used in passenger cars of estate or touring type in  
15 order to allow an increase of the vehicle's luggage space.

It is known that head restraints have a considerable effect in preventing injury, especially concerning injuries to the neck vertebrae. It is therefore very common also that the  
20 back seat in passenger cars is equipped with head restraints. In passenger cars of the estate or touring type it is however desirable that the back seat can be folded down in order to form said luggage space.

In normal passenger compartments, ergonomically shaped head restraints will bump against the front seats and make a complete folding down of the back seat more difficult. If the back seat can not be folded down completely, a sloping load surface is obtained and a luggage space which is  
30 difficult to use in a rational manner. This problem can be solved if the head restraints are made raisable and lowerable so that they can be lowered into the backrest before this is folded forwards. However it has shown itself to be the case that people are often negligent with raising  
35 up the head rest again when the backrest is folded back. In this case the head restraint will have lost its intended protective effect.

## OBJECT OF THE INVENTION

An object of the present invention is to achieve a head restraint for foldable backrests, which restraint is automatically retracted into the backrest upon folding forwards or backwards and which returns to an active protective position on folding back of the backrest.

An additional object of the invention is to allow adjustment of the head rest within an adjustment range, from which the restraint can be retracted into the backrest when this is folded down and returned when the backrest is folded up.

## SUMMARY OF THE INVENTION

Said object is achieved according to the invention in that the head restraint is displaceably carried in the framework and connected with a second pivot location in the vehicle which is positioned at a certain distance from the first pivot location in the vehicle's longitudinal direction so that the head restraint is retracted into or against the backrest upon folding this down and is displaced back to an active position upon folding up of the backrest.

Preferred embodiments of the invention are defined in the appended subclaims.

## DESCRIPTION OF FIGURES

One embodiment of the invention will now be described in more detail with reference to the accompanying drawings, in which

Fig. 1 is a side view showing a part of the passenger compartment with a foldable back seat backrest which is provided with a head restraint according to the invention,

Fig. 2 shows, on a larger scale, a sleeve member included in the invention,

Fig. 3 and 4 show, on a somewhat smaller scale, a part of the backrest and head restraint in two different positions, and

Fig. 5 shows, on an even more reduced scale, the backrest with the head restraint during folding back to its upright position.

#### PREFERRED EMBODIMENTS

Fig. 1 shows the backrest 10 with its outer upholstery 11 and inner framework 12 in a normally upright position with the head restraint 13 in its uppermost position, an intermediate position shown in dashed lines which represents a forward folding, and a second end position shown in solid lines where the backrest has been folded forwardly to a maximum. Fig. 1 thus represents the sequence of folding the backrest forwards, whereby it is clear that the head restraint is retracted into the back of the seat so that it does not project appreciably beyond this.

The frame 12 of the backrest thus pivots about an axis 14 which is fixedly connected with the vehicle chassis 15. A flap 16 is pivotally mounted in a pivot location 17 behind the backrest 10, so that this can be folded down and form an even bridging between the chassis 15 and the rear side of the backrest.

The framework 12 is provided with a holder 18 for a supporting arrangement 19. This arrangement 19 forms a support for a yoke rod 20, which extends downwardly into the backrest with two legs, from the head restraint's cushion 13a. A support 19 allows displacement of the head

restraint upwardly or downwardly with respect to the frame 12.

5 The lower ends of the rod of the yoke 20 are each connected with a respective sleeve arrangement 21. Each of these sleeve arrangements is in turn connected via a pivotable link arm 22 with a pivot location 23 on the vehicle chassis 15.

10 Fig. 2 shows the support 19 and the sleeve arrangement 21 in more detail, from which it is clear that the yoke rod 20 on the rear, right side of the figure is provided with five chamfered notches 24, 24a, which co-operate with a yoke formed spring member 25. Due to the fact that both outer  
15 notches 24a in the row are provided with an abutment edge, whilst the other notches 24 are double chamfered, the end notches form an adjustment range in co-operation with the spring member 25, within which the yoke rod is displacable.

20 The yoke rod 20 is provided additionally with a series of notches 26, which together with the end edges 27 on the rod 20 and a second yoke-formed spring member 28, form a blocking mechanism which, due to the chamfering of the notches, only acts in a downward direction. The head  
25 restraint 13 can thus be drawn freely upwardly within the adjustment range, but is blocked against lowering. Lowering of the restraint is made possible by this being tilted in a forward direction until the spring 28 is released from a tongue 29 projecting from the support 19, which tongue  
30 normally presses the spring member 28 against the yoke rod, whereby the head restraint can be displaced downwardly into the backrest within its adjustment range. Tilting of the head restraint is possible due to the fact that there is a certain movement in the support 19.

35

The head restraint 13 can, as described above, be positioned at one of five levels within the adjustment range. When the backrest is to be folded down i.e. to the left in the figures, a conventional blocking device which normally keeps the backrest locked in the upright position is released. When the backrest is then folded in a counter clockwise direction in the figures the distance between both pivot locations 14 and 23 will give rise to a tensile force occurring in the link arms 22. The tensile force will pull the sleeve 21 downwardly along its respective yoke rod 20, until the spring means 25 reaches its lower abutment notch 24a. Fig. 1 and 2 show a starting position in which the head restraint is in its uppermost position and the spring 25 is thus already in engagement in said abutment notch.

In this position the link arm 22 starts to pull the yoke rod downwardly into the backrest, as is clear from Fig. 4. In this way the tongue 29 is released from the spring member 28 and is thus released from the yoke rod. When folding of the backrest has been completed this assumes the position which is shown in the left part of Fig. 1.

During the folding of the backrest back to its vertical position the head restraint will be moved upwardly in the backrest due to the distance between both pivot locations 14 and 23. At the start of this sequence the sleeve 21 will be pressed upwardly along the respective yoke rod, as a result of the upwardly directed forces from the link arm 22, until the spring member 25 engages against the upper of the two end abutments 24a (see Fig. 5). From this position the sleeve 21 starts to displace the head restraint 13 upwardly. When the movement has finished, the head restraint will be in the lowermost position of the adjustment range, said position not being shown in any of

the figures. From this lower active position the restraint 13 can easily be moved upwardly by hand if another adjustment position is desired.

5 With the head restraint described above there is obtained an automatic reduction of the backrest's length dimension in the folded-down position, which reduction can be up to about 15 cm.

10 The invention is not limited to that described above but can be varied within the scope of the appended claims. For example the head restraint does not need to be adjustable but can be moved down from, or respectively moved back up to, one and the same active position. Additionally the head  
15 restraint according to the invention can be applied to other backrests apart from the back seat, whereby it is easy to modify the mechanism so that the head restraint is drawn into the back rest when this is folded backwardly.

20



## CLAIMS

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1. Head restraint for a backrest (10) in a vehicle, which backrest is foldable in the vehicle's (15) longitudinal direction and which is provided with an inner framework (12) which is pivotally supported at a first pivot location (14), said head restraint being displaceably carried in the framework (12) and connected with a second pivot location (23) in the vehicle which is positioned at a certain distance from the first pivot location in the vehicle's longitudinal direction, whereby on folding down of the backrest, the head restraint (13) is retracted into or against this and is displaced back to an active position on folding up of the backrest, characterized in that it comprises at least one rod-shaped or tube-shaped member (20) which is connected with the second pivot location (23) via at least one sleeve member (21) and one joining member (22) extending between this and the pivot location.

2. Head restraint according to claim 1, in which the backrest is foldable forwards in the vehicle's longitudinal direction, characterized in that the second pivot location (23) is positioned behind the first pivot location (14) in the vehicle's longitudinal direction.

3. Head restraint according to claim 2, characterized in that the sleeve member (21) is provided with at least one blocking member (25) which cooperates with any of a series of recesses (24, 24a) in the rod-shaped or tube-shaped member (20), which recesses allow the adjustment of the head restraint into the desired

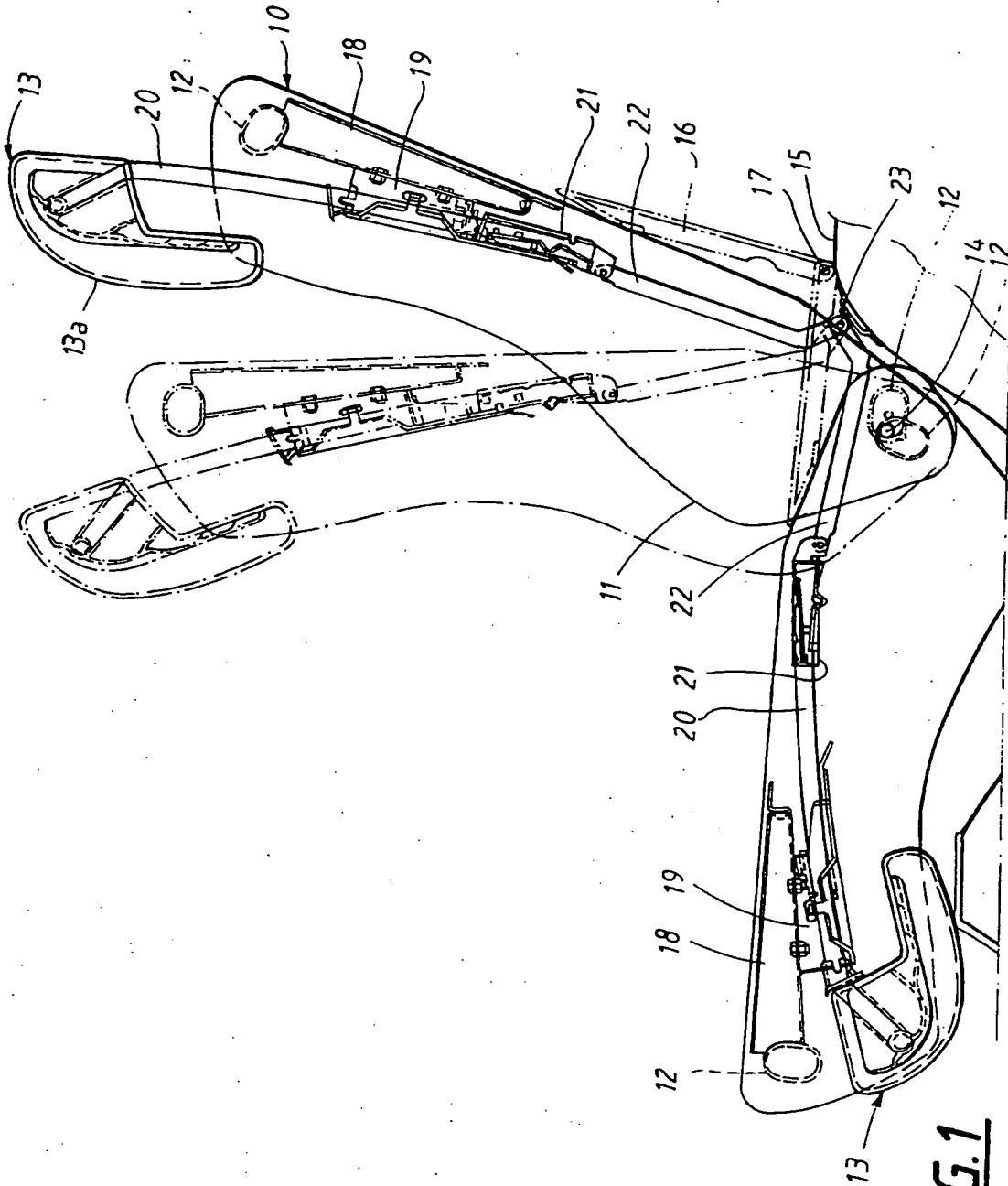
height position within an adjustment range defined by the sleeve member and the recesses.

4. Head restraint according to claim 3,  
5 c h a r a c t e r i z e d in that the rod-shaped or tube-shaped member (20) is yoke-shaped with two legs extending downwardly into the backrest through supporting means (19) in the framework (12), whereby at least the one rod-shaped or tube-shaped member extends through a sleeve member (21).

10 5. Head restraint according to claim 4,  
c h a r a c t e r i z e d in that the sleeve member (21) is provided with a second blocking member (28) which allows raising of the head restraint within an adjustment range,  
15 but which blocks in the opposite direction, said second blocking means being releasable for lowering of the head restraint.

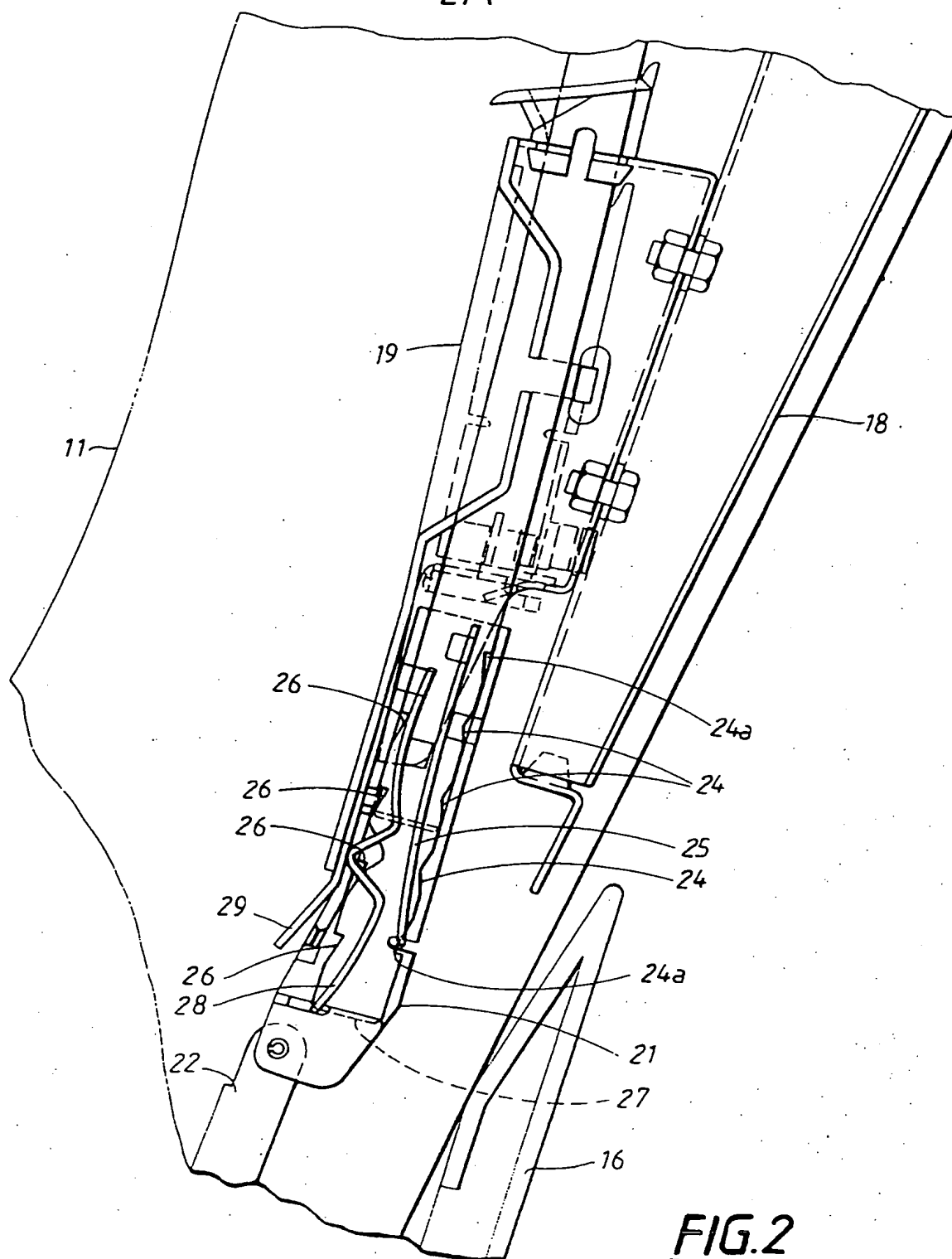
20 6. Head restraint according to claim 5,  
c h a r a c t e r i z e d in that the second blocking member (28) is releasable by means of the head restraint being tilted forwardly in the vehicle's longitudinal direction.

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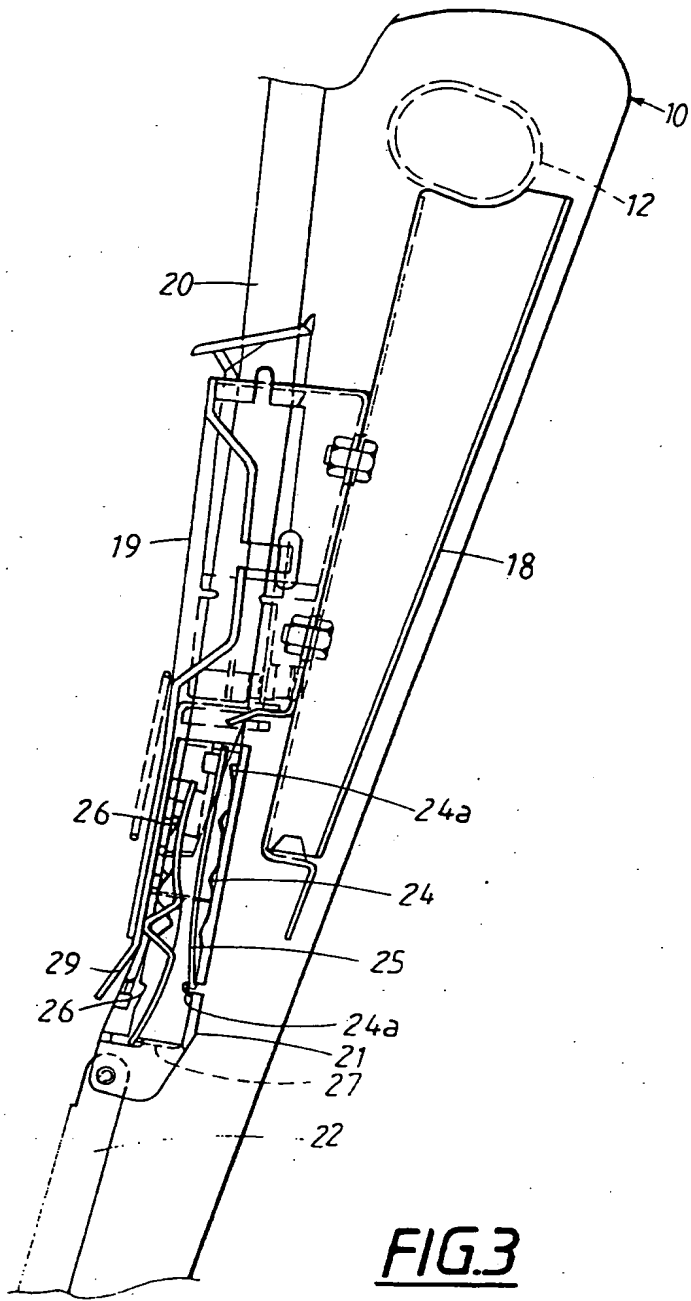
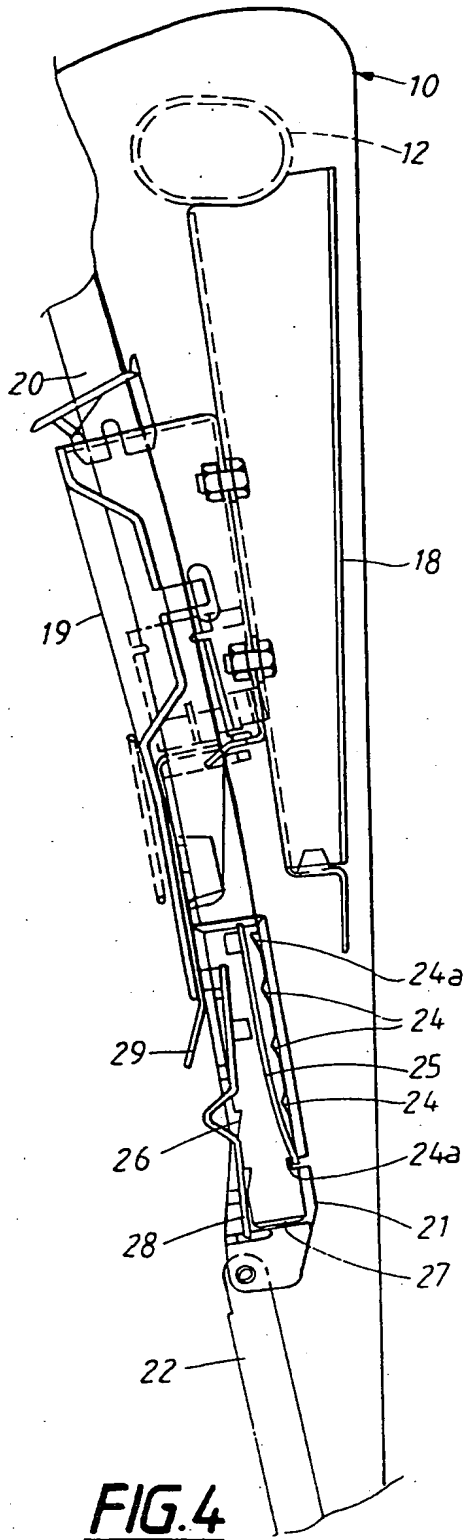


**FIG. 1**

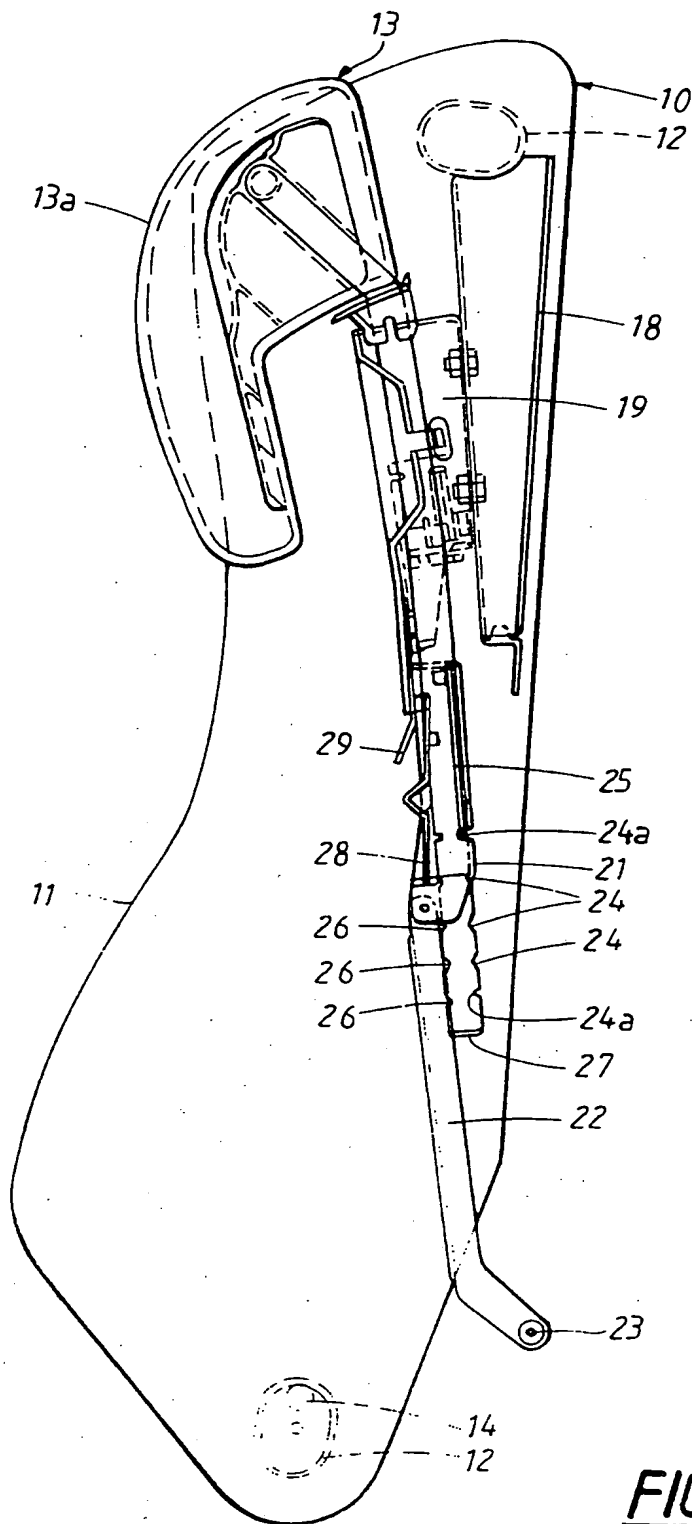
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**FIG. 2**

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4/4



**FIG.5**

# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00505

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC5: B 60 N 2/48, 2/36</b>														
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched<sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC5</td> <td style="padding: 5px;">B 60 N</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the extent that such Documents are included in Fields Searched<sup>8</sup></div> <p style="padding: 5px;">SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	B 60 N								
Classification System	Classification Symbols													
IPC5	B 60 N													
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category<sup>*</sup></th> <th style="border-bottom: 1px solid black;">Citation of Document,<sup>11</sup> with indication, where appropriate, of the relevant passages<sup>12</sup></th> <th style="width: 10%; border-bottom: 1px solid black;">Relevant to Claim No.<sup>13</sup></th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, A1, 2932181 (Z MICHNIOWSKI ET AL) 14 February 1980, see figures 1,2 --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-6</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, C2, 3306188 (AUDI AG) 2 January 1986, see column 2, line 57 - column 3, line 12; figures 1,2 --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-6</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3021098 (A M SPOUND) 13 February 1962, see column 1, line 68 - column 2, line 10; figures 1,2,3 -- -----</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-6</td> </tr> </table>			Category <sup>*</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	A	DE, A1, 2932181 (Z MICHNIOWSKI ET AL) 14 February 1980, see figures 1,2 --	1-6	A	DE, C2, 3306188 (AUDI AG) 2 January 1986, see column 2, line 57 - column 3, line 12; figures 1,2 --	1-6	A	US, A, 3021098 (A M SPOUND) 13 February 1962, see column 1, line 68 - column 2, line 10; figures 1,2,3 -- -----	1-6
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>* Special categories of cited documents:<sup>10</sup></b></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"a" document member of the same patent family</p> </div> </div>														
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">           Date of the Actual Completion of the International Search  <b>28th January 1993</b> </td> <td style="width: 50%; padding: 5px;">           Date of Mailing of this International Search Report  <b>04 -02- 1993</b> </td> </tr> <tr> <td style="padding: 5px;">           International Searching Authority  <div style="text-align: center; margin-top: 10px;"><b>SWEDISH PATENT OFFICE</b></div> </td> <td style="padding: 5px;">           Signature of Authorized Officer    <b>Christer Jönsson</b> </td> </tr> </table>			Date of the Actual Completion of the International Search <b>28th January 1993</b>	Date of Mailing of this International Search Report <b>04 -02- 1993</b>	International Searching Authority <div style="text-align: center; margin-top: 10px;"><b>SWEDISH PATENT OFFICE</b></div>	Signature of Authorized Officer  <b>Christer Jönsson</b>								
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A1- 2932181	80-02-14	FR-A- 2432855	80-03-07
DE-C2- 3306188	86-01-02	NONE	
US-A- 3021098	62-02-13	NONE	